

Amendments To The Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A semiconductor wafer polishing method comprising
subjecting a surface of the wafer to both rotational ^{and} vibratory polishing motion motions, the
vibratory polishing motion having an amplitude in the range from about 0.05 to about 2.0 mm.

Claim 2 (currently amended): The method of claim 1, wherein the amplitude of the
vibratory polishing motion is in the range from about 0.10 to about 0.5 mm.

Claim 3 (currently amended): A method of polishing a film formed on a workpiece, the
method comprising: subjecting the film to both rotational and vibratory polishing in presence of
a chemical slurry with the vibratory polishing motion having at an amplitude in the range from
about 0.05 to about 2.0 mm.

Claim 4 (currently amended): A method of polishing a thin film comprising features
formed by a damascene process on a semiconductor wafer, the method comprising: subjecting
the thin film to both rotational and vibratory polishing ~~motion motions~~ with the vibratory
polishing motion having an amplitude in the range from about 0.05 to about 2.0 mm.

Claim 5 (original): An apparatus for polishing a surface of a workpiece, the apparatus comprising:

- (a) a carrier adapted for securely holding at least one workpiece to expose a surface of the workpiece to be polished;
- (b) a polishing pad supported on a platen spaced from the carrier;
- (c) means for imparting vibratory motion to the platen, the means comprising: a sleeve having mounted thereto a pair of rotary bearings, a first bearing of the pair mounted to the platen and the sleeve, the first bearing having a central axis offset by from about 0.05 to about 2.0 mm from a central axis of a second bearing of the pair, the second bearing mounted to the sleeve and a support frame; and
- (d) a drive motor coupled to the sleeve.

Claim 6 (withdrawn): An apparatus for polishing the surface of a workpiece, the apparatus comprising:

- (a) a carrier adapted for securely holding at least one workpiece to expose a surface of the workpiece to be polished;
- (b) a polishing pad supported on a platen spaced from the carrier;
- (c) means from imparting vibratory motion to the carrier, the means comprising: a sleeve having mounted thereto a pair of rotary bearings, a first bearing of the pair mounted to the carrier and the sleeve, the first bearing having a central axis offset by from about 0.05 to about 2.0 mm from a central axis of a second bearing of the pair, the second bearing mounted to the sleeve and a support frame; and

(d) a drive motor coupled to the sleeve.

Claim 7 (previously presented): An improvement in an apparatus for orbital polishing of semiconductor wafers to planarize surface of the wafers, the apparatus comprising a pad mounted in a platen, the platen attached to mechanical means for causing the pad to orbit about an axis offset from a central axis of the pad, the pad spaced from carrier to wafer, the carrier coupled to a drive motor to rotate the carrier, and means for pressing a wafer in the carrier forceably against the pad, the improvement comprising: offsetting the orbital axis from the central axis of the pad by from about 0.05 to about 2.0 mm to cause vibratory motion when the pad orbits.

Claim 8 (withdrawn): An improvement in an apparatus for orbital posing of semiconductor wafers to planarize surface of the wafers, the apparatus comprising a pad mounted in a platen; and a carrier spaced from the pad, the carrier adapted for holding the wafer being polished, the carrier coupled to mechanical means for causing the carrier to orbit about an orbital axis offset from a central axis of the carrier; and means for pressing a wafer in the carrier forcibly against the pad, the improvement comprising: offsetting the orbital axis from the central axis of the pad by from about 0.05 to about 2.0 mm to cause vibratory motion when the carrier rotates.

Claim 9 (withdrawn): An apparatus for polishing a semiconductor wafer, the apparatus comprising:

- (a) a wafer carrier adapted for holding at least one wafer to expose a wafer surface to be polished;
- (b) a polishing platen spaced from the carrier, the platen adapted to move back and forth linearly with respect to the underside of the carrier; and
- (c) a vibration actuator mechanically coupled to impart vibratory motion to the platen with vibratory displacement in a direction at right angles to the back and forth motion of the platen.

Claim 10 (withdrawn): The apparatus of Claim 9, wherein the vibratory motion has a frequency of from about 2,000 to about 10,000 rpm.

Claim 11 (withdrawn): The apparatus of Claim 9, wherein the vibratory motion has an amplitude of from about 0.05 to about 2.00 mm.

Claim 12 (withdrawn): An apparatus for polishing a surface of a workpiece comprising:

- (a) a carrier adapted for securely holding at least one workpiece to expose a surface of the workpiece to be polished.
- (b) a linear belt polishing pad spaced from the carrier, a polishing face of the belt facing the carrier, and an opposite face of the belt supported by a support plate;

(c) means for imparting vibratory motion to the carrier, the means comprising at least a pair of rotary bearings, the bearings rotating about axes offset from each other to impart vibratory motion to the carrier.

Claim 13 (withdrawn): The apparatus of Claim 12, wherein the vibratory motion has a frequency of about 2,000 to about 10,000 rpm.

Claim 14 (withdrawn): The apparatus of Claim 12, wherein the vibratory motion has an amplitude of about 0.05 to about 2.00 mm.

Claim 15 (currently amended): The method of Claim 1, wherein the frequency of the vibratory polishing motion is in the range from about 2,000 to about 10,000 rpm.

Claim 16 (currently amended): The method of Claim 2, wherein the frequency of the vibratory polishing motion is in the range from about 2,000 to about 10,000 rpm.

Claim 17 (currently amended): The method of Claim 3, wherein the frequency of the vibratory polishing motion is in the range from about 2,000 to about 10,000 rpm.

Claim 18 (currently amended): The method of Claim 4, wherein the frequency of the vibratory polishing motion is in the range from about 2,000 to about 10,000 rpm.

Claim 19 (original): The apparatus of Claim 5, wherein the vibratory motion has a frequency of about 2,000 to about 10,000 rpm.

Claim 20 (original): The apparatus of Claim 6, wherein the vibratory motion has a frequency in the range from about 2,000 to about 10,000 rpm.

Claim 21 (original): An apparatus for polishing workpieces; the apparatus comprising:
a carrier adapted for holding at least one workpiece;
a polishing pad supported on a platen spaced from the carrier, the pad for polishing a workpiece in the carrier; the platen coupled to at least a pair of rotary bearings with offset central axes such that when the bearings rotate, the platen vibrates at a frequency in the range from about 2,000 to about 10,000 rpm.

Claim 22 (currently amended): The apparatus of Claim ~~4~~21, wherein the axes are offset by from about 0.05 to about 2 mm.

Claim 23 (currently amended): An apparatus for polishing a workpiece, the apparatus comprising:

a carrier for holding at least one workpiece to be polished;
a platen spaced from the carrier;
a polishing medium interposed between the platen and the carrier, the medium supported by the platen; and

means for imparting a rotational motion to the platen and a vibratory polishing motion between the carrier and the platen with the vibrational polishing motion having at a frequency of about 2,000 to 10,000 rpm and an amplitude of about 0.05 to about 2.0 mm.

Claim 24 (withdrawn): The apparatus of Claim 23, wherein the platen is a support plate, and the polishing medium is a polishing belt.

Claim 25 (original): The apparatus of Claim 23, wherein the carrier is coupled to a drive motor for rotating the carrier.

Claim 26 (withdrawn): The apparatus of Claim 23, wherein the carrier is coupled to a drive motor and to means for vibrating the carrier.

Claim 27 (original): The apparatus of Claim 23, wherein the platen is coupled to a drive motor.

Claim 28 (withdrawn): The apparatus of Claim 23, wherein the platen is coupled to a drive motor and to means for rotating the platen.

Claim 29 (withdrawn): The apparatus of Claim 23, wherein during polishing, carrier movement comprises orbiting and vibrating.

Claim 30 (original): The apparatus of Claim 23, wherein during the polishing, platen movement comprises orbiting and vibrating.